Ørsted

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1 - Company Introduction

This report focusses on Ørsted. Originating as a fossil fuel company, Ørsted has reinvented itself as a leader in primarily offshore wind power in the UK. The company's UK portfolio includes Offshore and onshore wind energy, solar PV projects and energy storage solutions (Ørsted 2023. -a). The competitive strategy of Ørsted does not revolve around price competition; rather, it emphasises delivering high-quality sustainable energy solutions. (Ørsted n.d. -c)

1.1 Market Overview

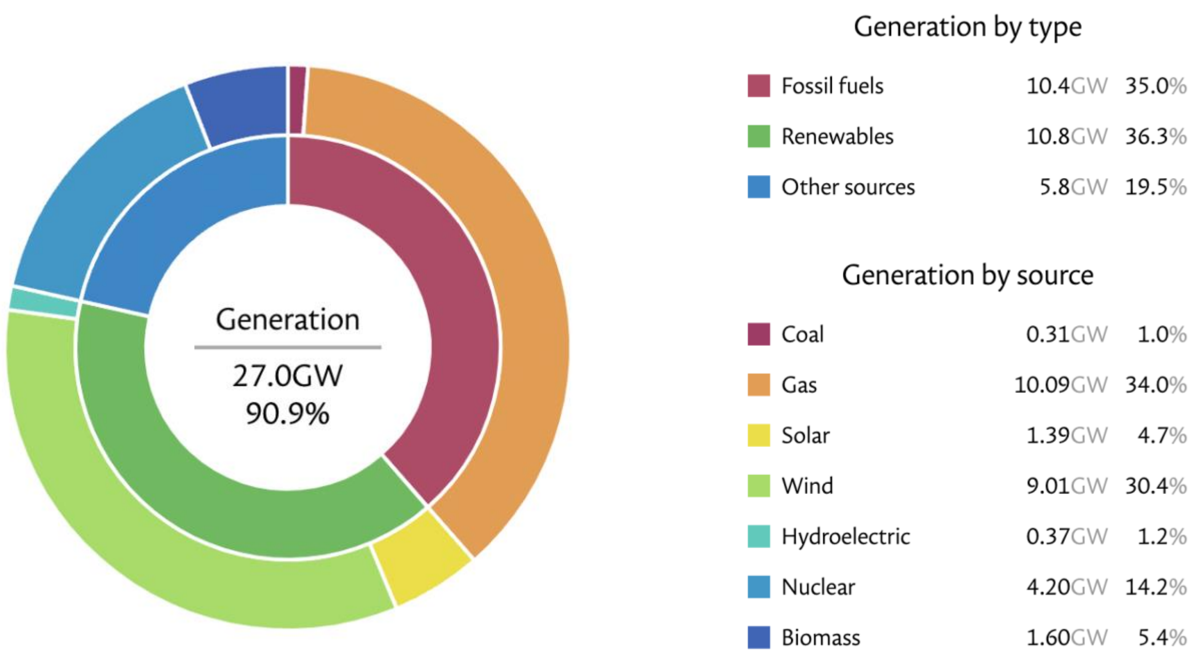
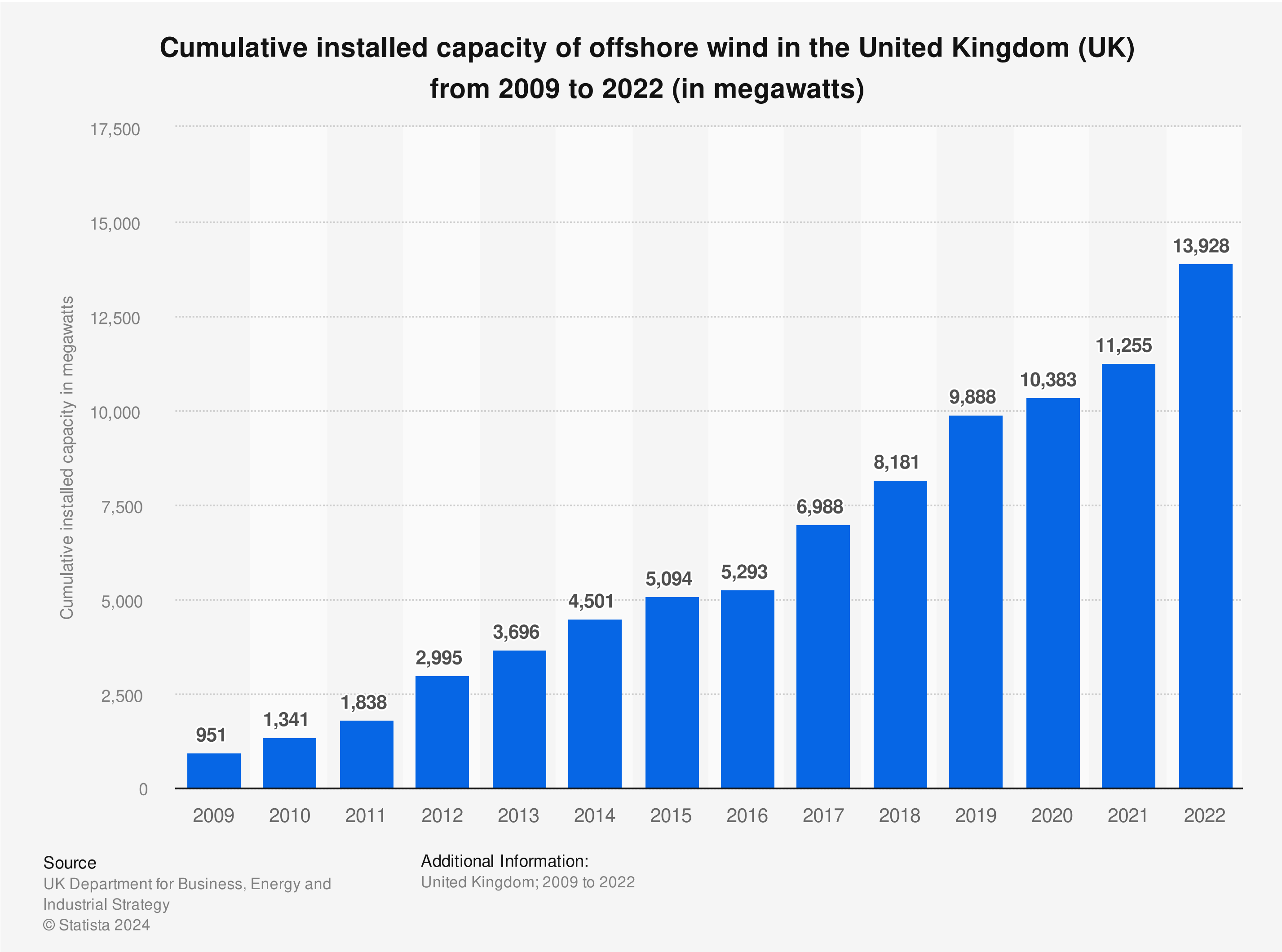


Figure 1 - The pie chart on the UK's National Grid (Morley, K., n.d.)

The renewable energy market, especially wind, accounts for a significant proportion of the UK energy market. Last year wind accounted for 30.4% of the UK energy mix by 2050 (Morley, K. , n.d.). According to the Office for National Statistics, electricity generation from wind power in the UK has increased by 715% from 2009 to 2020 and turnover from wind energy was nearly £6 billion in 2019. The UK is home to the largest offshore wind farm in the world (Office for National Statistics, 2021), which is Ørsted's Hornsea project located off the coast of Yorkshire (Ørsted, 2024 -b).

Figure 2 – Cumulative offshore wind capacity in the United Kingdom (Statista, 2023 -a)



The UK offshore wind energy capacity has seen a significant rise, with a capacity of over 13,928 megawatts in 2022 (Statista, 2023 -a).

1.2 Ørsted's UK Product Range

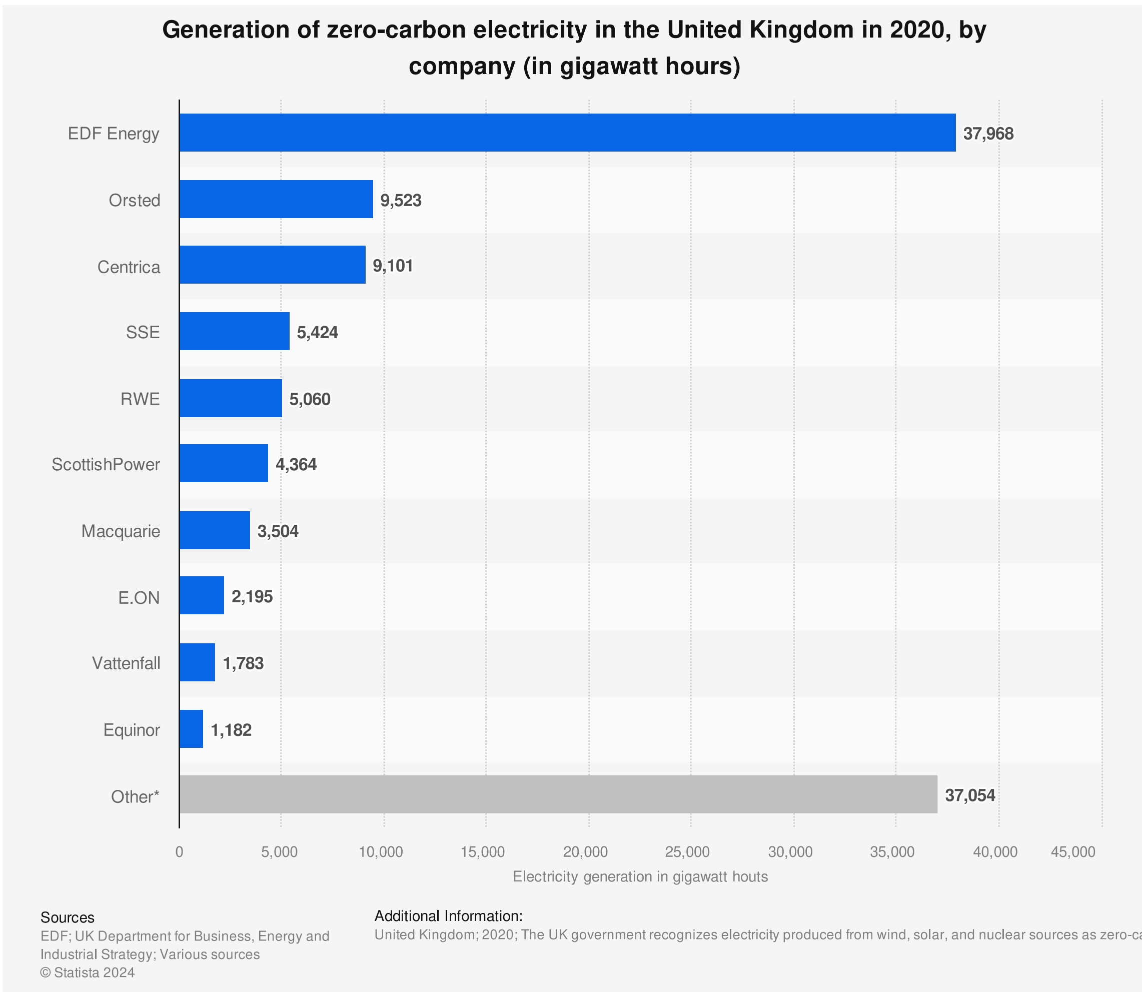
1. **Offshore Wind Energy**
   Offshore wind generation is Ørsted's flagship product in the UK, representing the largest portion of their energy capacity in the UK. With 8.5 gigawatts (GW) of capacity (Ørsted. 2023 -a).
2. **Onshore Wind Energy**

Onshore wind energy is generated by wind turbines located on land. Ørsted's onshore wind capacity in the UK is 0.5 GW (Ørsted. 2023 -a).

3. **Solar PV Energy**
Solar photovoltaic (PV) panels convert sunlight directly into electricity. Ørsted's solar PV capacity in the UK is 0.1 GW (Ørsted. 2023 -a).

1.3 Main UK Competitors

Figure 3 - Statista (2023 - b) UK zero carbon electricity generation by company



Ørsted faces competition from several major utilities in the renewable energy sector. In 2020, EDF Energy was at the forefront of producing zero-carbon electricity in the UK, generating around 38 terawatt-hours of clean energy. This accounted for approximately 32% of the country's total zero-carbon electricity production for the year. Ørsted and Centrica were also significant contributors, each generating over nine terawatt-hours (Statista 2023 -b).

1.3 Value Chain and customer base

Ørsted's value chain lacks diversity in the UK compared with Centrica or EDF Energy, with offshore wind energy projects accounting for about 95% (8.5MW) of its capacity. The lifecycle of offshore wind projects starts from site identification and acquisition, followed by design, planning, securing permits, and fundraising from stakeholders. The process progresses to the construction phase, involving material procurement and turbine installation. Once operational, Ørsted generates electricity, which is sold directly through the UK National Grid via power purchase agreements from energy providers (PPAs) (FORCE Technology, n.d.). Ørsted sells to approximately 4.5 million residential units via the national grid, a number anticipated to rise to 5.6 million with the completion of new projects (Ørsted, n.d. -b). Additionally, Ørsted enters into Corporate Power Purchase Agreements (CPPAs) with large businesses, allowing them to purchase renewable energy directly at agreed prices to meet sustainability goals (Ørsted, n.d. -a). The value chain concludes with the responsible decommissioning of wind farms at the end of their operational life.

2 - Financial analysis

To evaluate Ørsted's financial health in the UK, I analysed the financials of their global operations, as their UK-specific operations do not consolidate under a single account and only represent a segment of Ørsted's overall financial health. I used data from the ORBIS database for "ORSTED AS" (ORBIS, 2024), converting the data into British pounds for the analysis. This analysis also includes a comparison with data from the FAME database of Centrica and EDF Energy (FAME, 2024), which, according to Figure 3 (Statista, 2023), are also significant competitors in the UK's renewable energy sector. The margin formulae are from the FAME database (FAME, 2024). The formulae and raw data used for this analysis have been put in the appendix (Appendix).

Financial Ratios

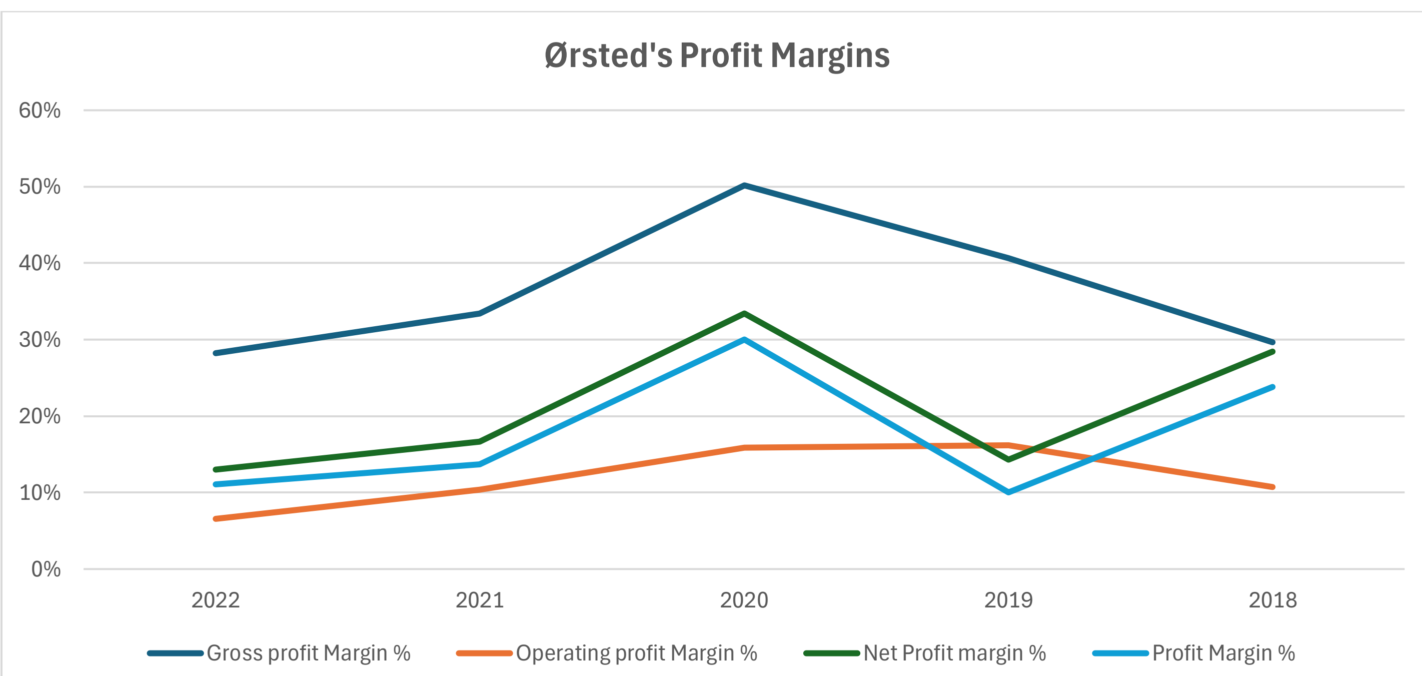


Figure 4: Profit Margins of Ørsted in between 2018-2022 (ORBIS, 2024). (Data in Appendix)

2.1 Gross Profit Margin

Ørsted's gross profit margins have displayed a notable fluctuation over the past five years. Starting at 29.66% in 2018, the margin peaked at 50.18% in 2020, indicating a period of strong financial performance. However, there has been a subsequent decline, with the margin reducing to 33.37% in 2021 and further to 28.23% in 2022. This downward trend in margins (despite increased gross profits from 2020-2022) suggests challenges with rising costs, highlighting the need for Ørsted to adapt its strategies to maintain costs to ensure profitability in a changing, post covid environment. Turnover increased from £9,278,093,000 in 2018 to £16,089,519,000 in 2022 (ORBIS, 2024).

2.2 Operating Profit Margin

Ørsted's operating profit margins show less variability over the last five years than gross margins. Starting at 10.68% in 2018, the margins improved, reaching a peak of 16.18% in 2019 and slightly less at 15.85% in 2020, reflecting strong operational efficiencies. However, there has been a notable decline since then, with margins falling to 10.38% in 2021 and further to 6.57% in 2022. This recent downturn suggests increased operational costs or competitive pressures. Gross profit margins remained considerably higher than operating margins, indicating that while Ørsted effectively manages its direct costs, the broader operational expenses impact net profitability significantly (ORBIS, 2024).

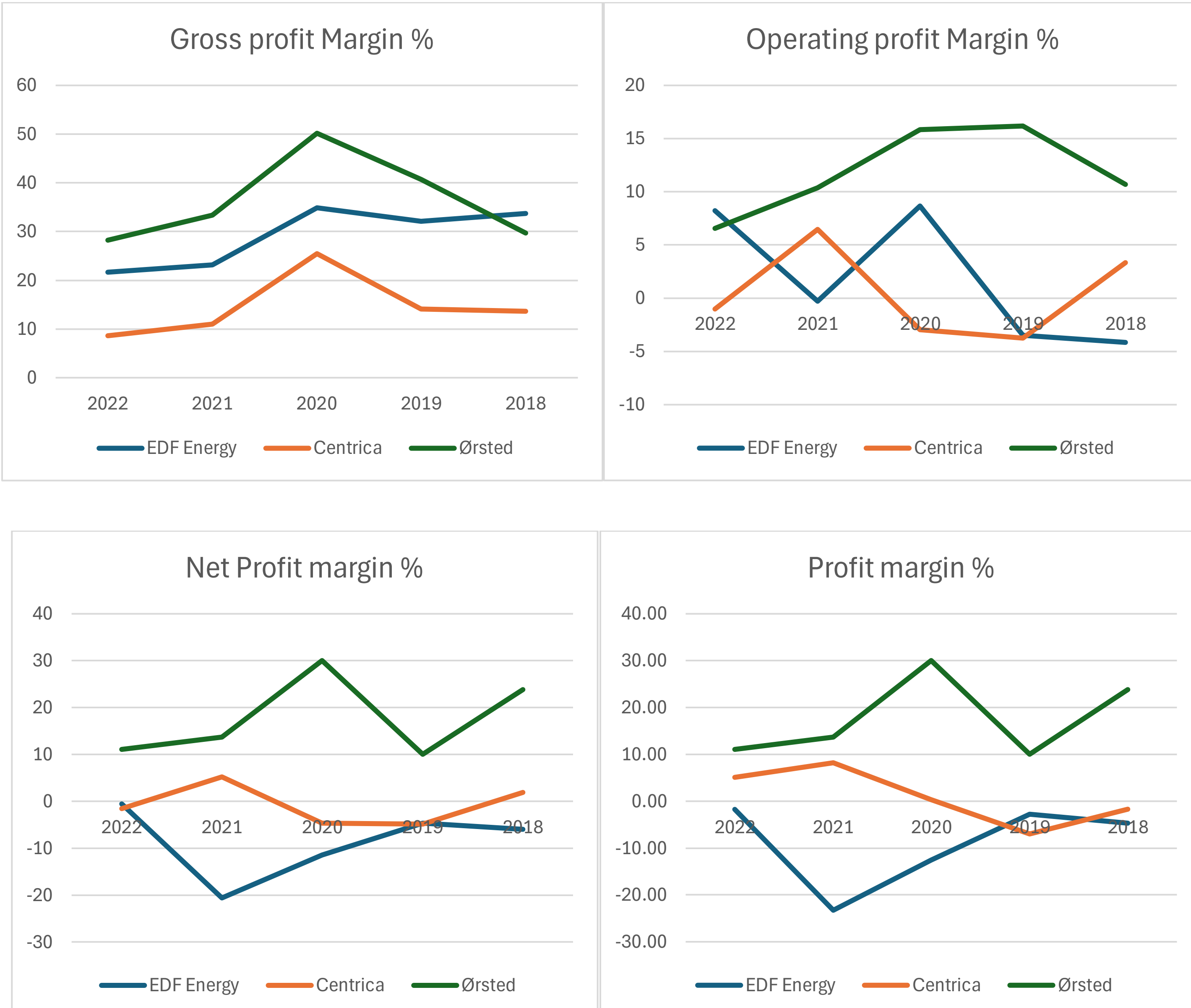
2.3 Net Profit Margin

Looking at net profit margins (profits before tax/turnover), we see more volatility than operational margins. Profit margins (profits after tax/turnover) show very similar trends to net margins, suggesting tax doesn’t have much influence on profit margins. The increase of profit and Net profit margin from the operational margin point to significant positive influences from non-operational factors such as interest, and other non-core business activities, which can dramatically affect the bottom line. This was particularly true in 2020 and 2018, where net profit were around 18% higher than operational profit. (ORBIS, 2024).

Comparisons across margins highlights that while Ørsted manages its non-operational financial factors well, its operational efficiency poses the biggest challenge to overall profitability for Ørsted.

2.4 Profit Margins Against Competitors

Figure 5-9: Gross, Operating, Net, and Profit margins of Ørsted Compared to Competitors between 2018-2022 (ORBIS, 2024; FAME, 2024) (Data available in Appendix)



Ørsted's profit margins compared to its competitors EDF Energy and Centrica reveal a clear pattern of stronger profitability. Ørsted has maintained higher gross profit margins over the years, significantly outperforming EDF Energy and Centrica. This suggests Ørsted's superior capability in managing the costs directly associated with its production and services. In terms of operating profit margins, Ørsted again shows a more robust profile. While EDF Energy and Centrica have experienced fluctuations, including negative margins, Ørsted's margins have consistently remained positive, reflecting effective operational control and cost management. The profit margin and net profit margins further emphasise Ørsted's superior financial health. Ørsted reached an impressive 33.42% net margin in 2020, and despite a decline, it maintained a healthy 13.01% net margin in 2022. In contrast, EDF

Energy and Centrica have struggled with negative net profit margins in multiple recent years, indicating challenges not just at the operational level but also possibly from financial and non-operating factors. (ORBIS, 2024; FAME, 2024)

2.5 Other Financial Indicators

Ørsted's Profit per Employee (PPE) decreased from £435,000 in 2018, to £261,000 the in 2022, suggesting decreased workforce productivity. The Return on Capital Employed (ROCE) (Profit before tax/non-current assets) also decreased, from 15.66% in 2018 to 7.36 % in 2022, indicating initially high but decreasing capital utilisation. Comparatively, in 2022, EDF Energy and Centrica's PPE were £-7,058,000 and £-19,194,000 respectively in 2022, and their ROCE figures were -0.18% and -5.23%. These figures indicate Ørsted's strong but decreasing position relative to its competitors in terms of labour and resource management (ORBIS, 2024; FAME, 2024).

Figure 10: RoCE (ORBIS, 2024; FAME, 2024) (Data in Appendix)

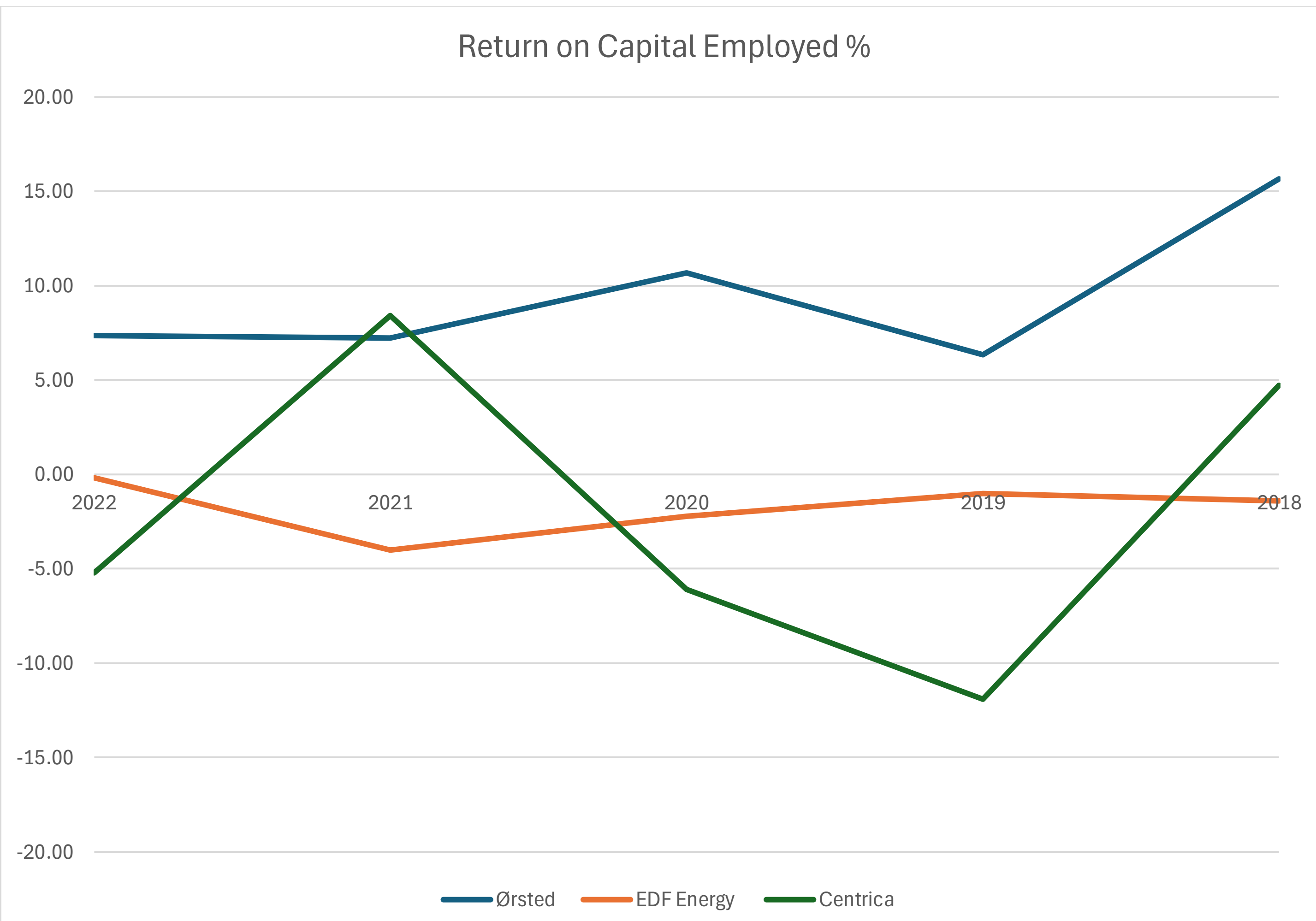
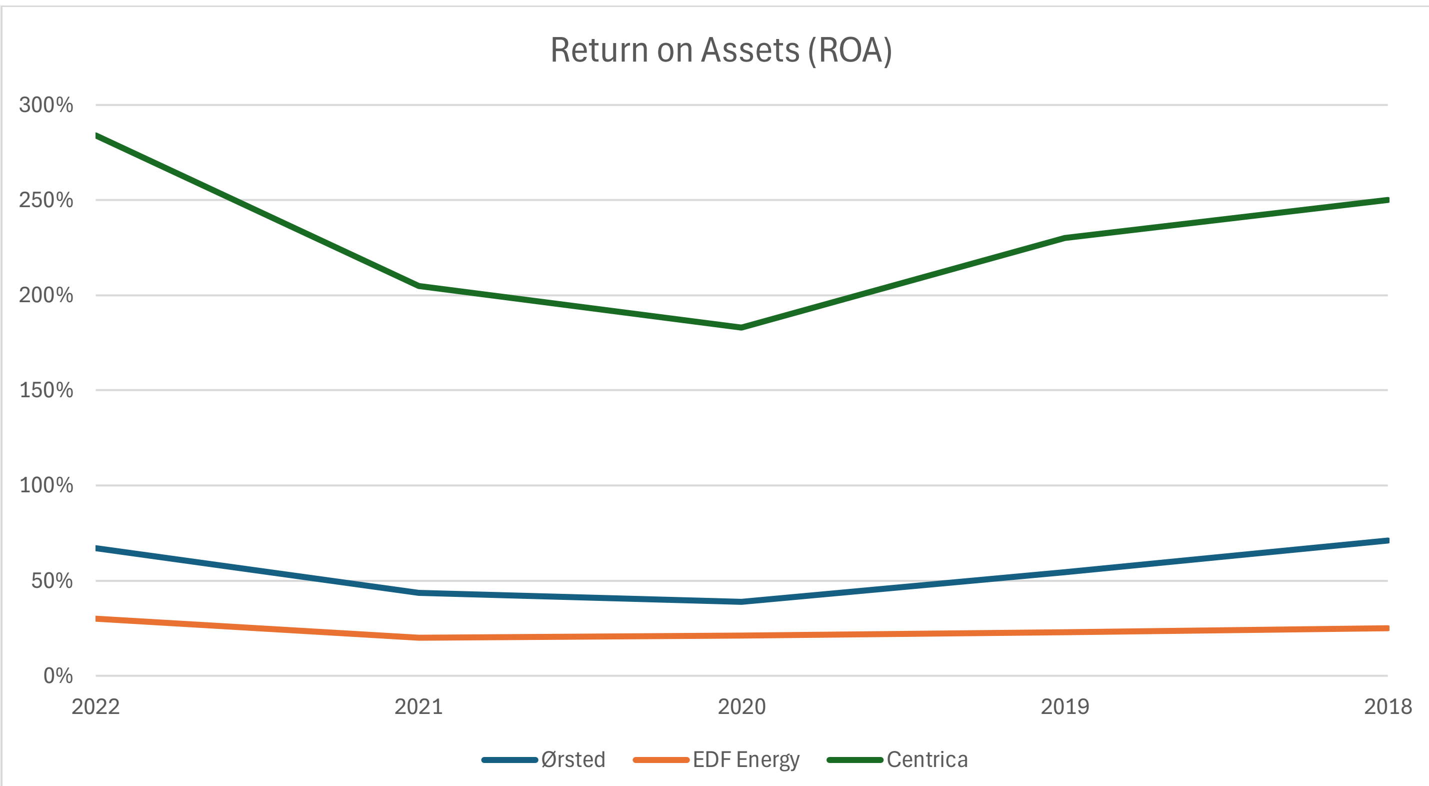


Figure 11 depicts the Return on Assets (ROA), which, while similar to Return on Capital Employed, specifically measures how efficiently a company's assets are used to generate turnover, without taking into account the company's debts and additional revenues (Turnover/non-current assets) (Maverick, 2021). Ørsted’s ROA has shown fluctuations over the past five years, starting at 71% in 2018, dipping to 39% in 2020, and slightly rising to 67% in 2022. In comparison, EDF had an ROA of 30% and Centrica had an ROA of 284% in 2022. This indicates that, despite the negative Net profit margins, Centrica is utilising their assets more efficiently in terms of ROA, and EDF is using their assets less efficiently. All three companies show the same trend of a dip in ROA during covid before recovering in 2022. (ORBIS, 2024; FAME, 2024)

Figure 11: RoA (ORBIS, 2024; FAME, 2024) (Data in Appendix)

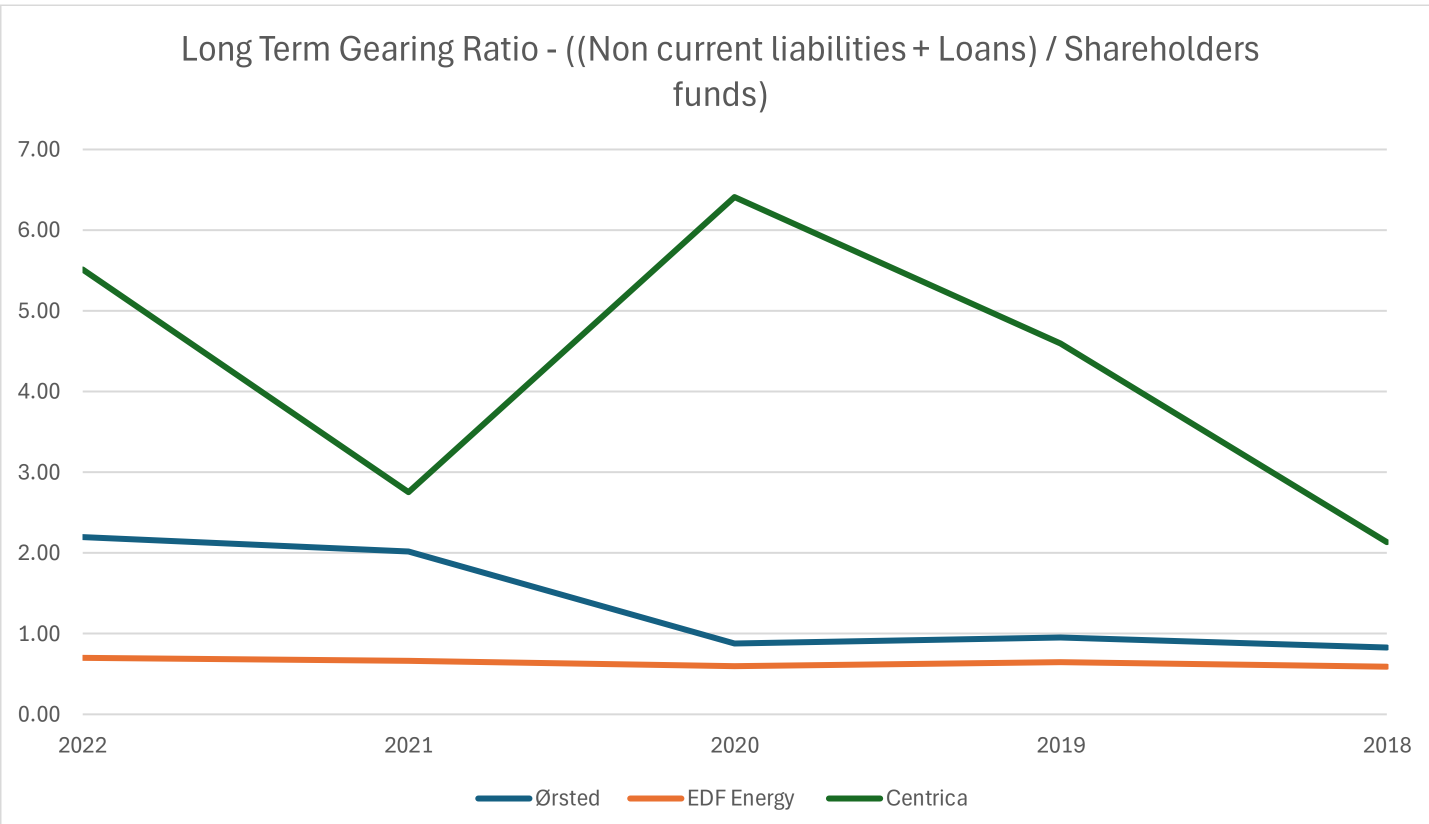


Leverage Ratios

2.6 Gearing Ratio

The gearing ratio measures financial stability and risk by comparing a company's debt to its equity (FAME, 2024). Ørsted's long-term gearing ratio has shown a significant increase over the past five years, moving from 0.83 in 2018 to 2.20 in 2022. This trend indicates that Ørsted has been increasing its use of debt relative to its equity, potentially to fund its expansion or invest in large projects like the Hornsea project (Ørsted, 2024 -b). In comparison, EDF Energy's gearing ratios are much lower, suggesting a more conservative approach to leveraging, with ratios only slightly increasing from 0.59 in 2018 to 0.70 in 2022. Centrica, on the other hand, exhibits highly volatile gearing ratios, reaching as high as 6.41 in 2020 and then dropping to 5.51 in 2022. This indicates a more aggressive and fluctuating use of debt financing, which could reflect differing strategic moves or responses to financial pressures. Ørsted's higher gearing ratios compared to EDF Energy, but more Conservative than Centrica, suggests a balanced approach to growth and financial management, though the upward trend may require monitoring to ensure long-term financial sustainability (ORBIS, 2024; FAME, 2024).

Figure 12: Gearing Ratios (ORBIS, 2024; FAME, 2024) (Data in Appendix)

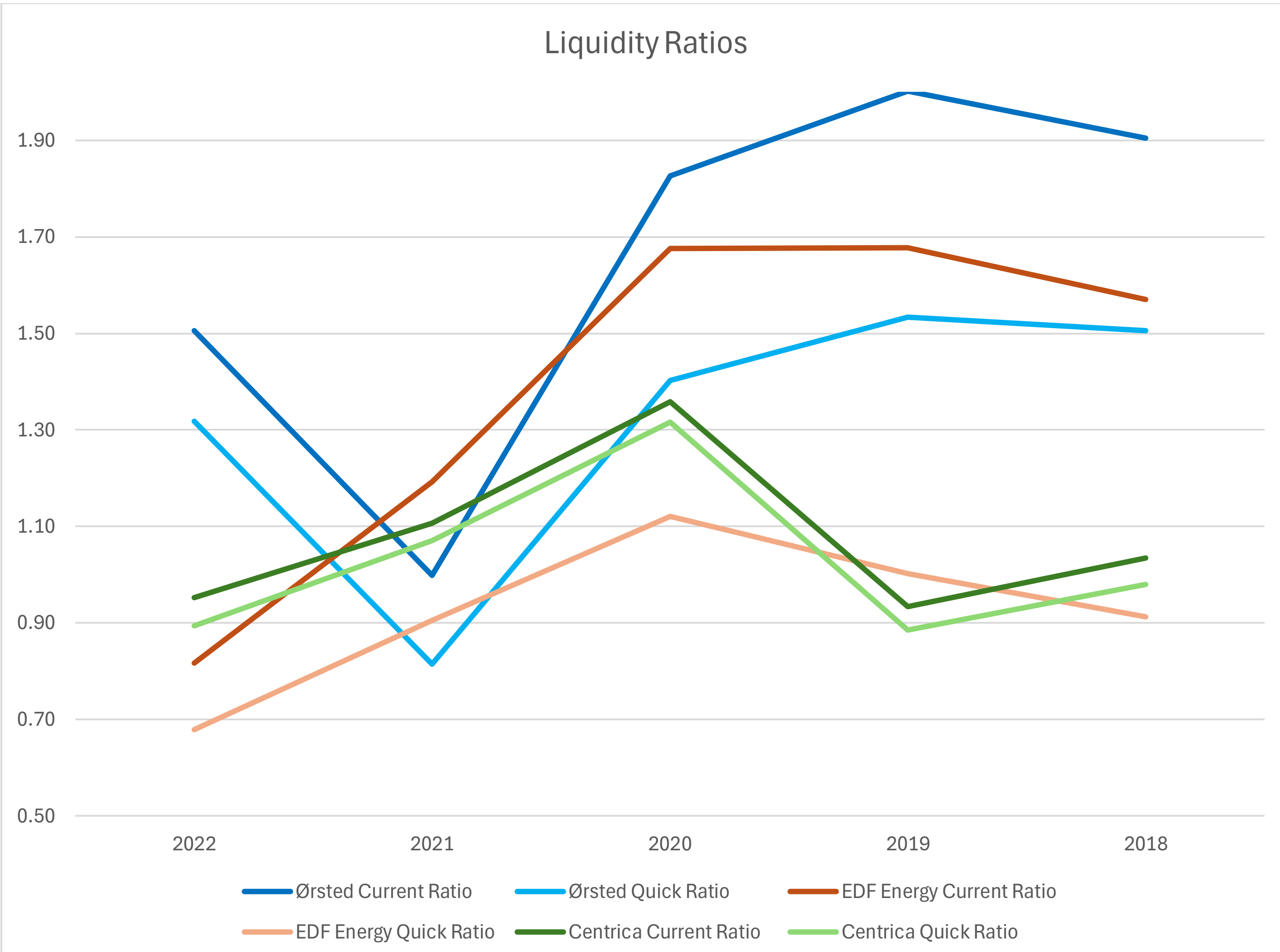


2.7 Liquidity Ratio

When examining the liquidity ratios, including both the current and quick ratios can be crucial for assessing a company's ability to meet its short-term financial obligations (Hayes, 2023). Ørsted's current ratios have shown variability but remain strong overall, peaking at 2.00 in 2019, then dipping during covid before recovering at 1.51 in 2022. This indicates a healthy ability to cover short-term liabilities with current assets. The quick ratio, which is more stringent by excluding inventory from assets, also reflects solid liquidity, with only a slight decrease from 1.51 in 2018 to 1.32 in 2022.

Compared to its competitors, Ørsted consistently maintains higher liquidity ratios. EDF Energy and Centrica have generally lower ratios, with EDF Energy's current ratio only reaching up to 1.68 and Centrica's quick ratio not surpassing 1.32. This suggests that Ørsted, Other than in 2021, was in a stronger position to handle its short-term financial obligations than its competitors, reflecting more conservative management of its assets and liabilities." (ORBIS, 2024; FAME, 2024)

Figure 13: Liquidity Ratios (ORBIS, 2024; FAME, 2024) (Data in Appendix)



2.8 Debtor collection period

Ørsted's debt collection period in 2022 was 55 days, showing a decrease from 91 days in 2021 and aligning more closely with its 2018 figure of 61 days. In comparison, EDF Energy's collection period in 2022 was slightly shorter at 53.12 days. Centrica demonstrates a quicker ability to collect debts, with a 2022 period of only 33.93 days. This analysis highlights Ørsted's intermediate position in debt collection efficiency among its peers. (ORBIS, 2024; FAME, 2024)

Financial Analysis Summary

Overall, Ørsted remains financially robust within the renewable energy sector, despite some areas requiring attention. Despite fluctuations, Ørsted's gross and operating margins have consistently outperformed those of its competitors, indicating a strong capability in managing production costs and operational efficiencies. This is evident from Ørsted’s consistently positive operating margin, even when EDF and Centrica experienced negative margins in several years. However, Ørsted has faced a decline in all margins from 2020 to 2022, which may be attributed to increased operational costs from covid. Net profit margins show significant volatility but remain healthier compared to the recent losses recorded by EDF and Centrica. In terms of asset and labour utilisation, Ørsted's metrics like PPE and RoCE have declined but remain more favourable than those of its competitors, (although Centrica has demonstrated much better ROA asset utilisation). The company’s financial structure shows a healthy but growing reliance on debt, which is managed more conservatively than Centrica’s volatile debt ratios, but more aggressive than EDF's leverage. Ørsted showcases superior liquidity, ensuring better coverage of short-term liabilities, despite a dip below competitors in 2021.

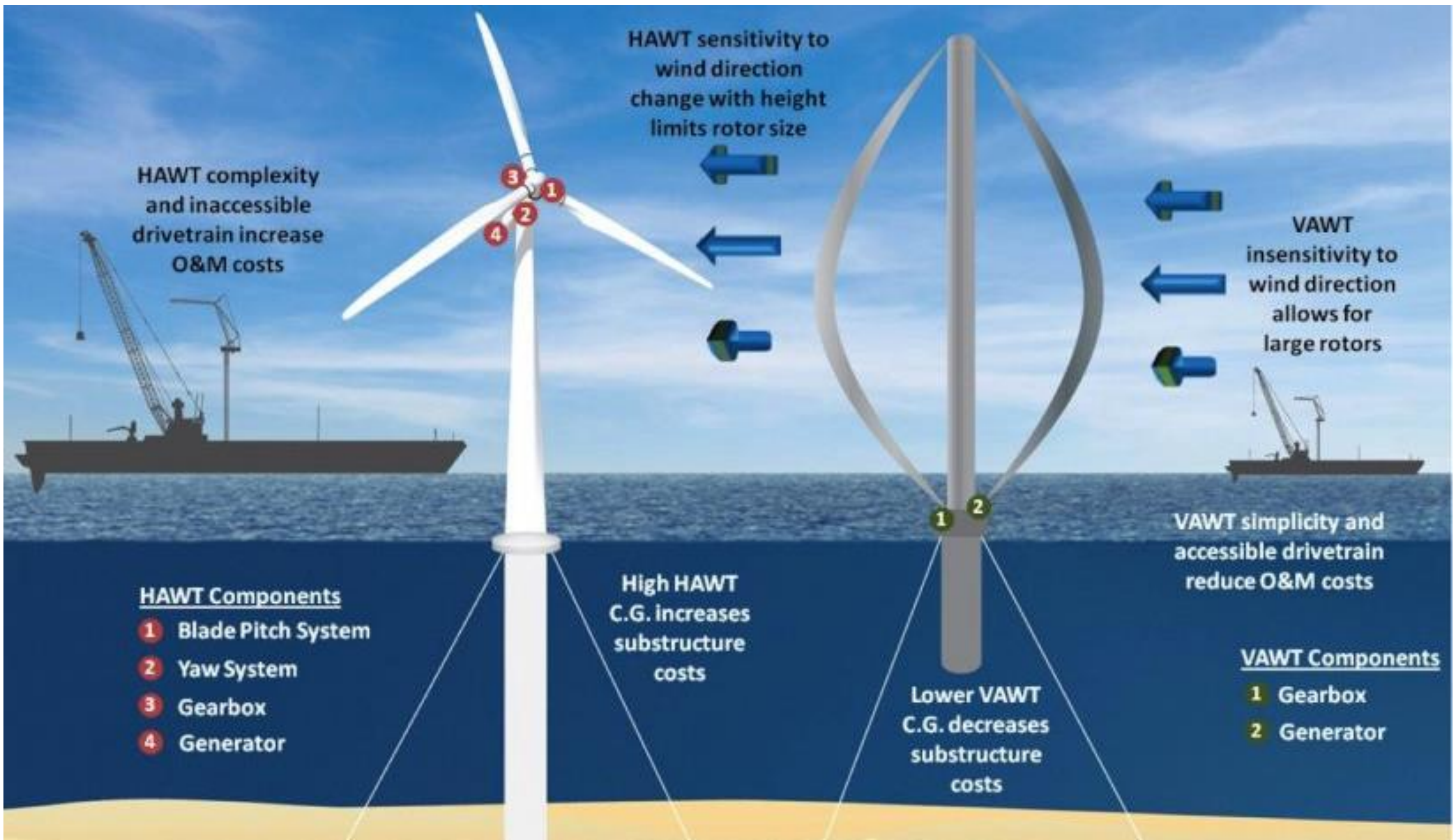
3 - Value Proposition

3.1 Benefits of Vertical Axis Wind Turbines

To add value in Ørsted's offshore wind energy projects, I propose Ørsted transitions from using Horizontal Axis Wind Turbines (HAWTs) to Vertical Axis Wind Turbines (VAWTs). VAWTs have notable advantages that could benefit Ørsted's future developments. HAWTs often face community opposition due to their large structures and the noise they generate, which can alter the aesthetics of landscapes or ocean areas, leading to challenges in project approvals (Ahmed & Cameron, 2014). In contrast, VAWTs are quieter and offer aesthetic versatility, potentially improving public perception and acceptance (Clos, 2024). Furthermore, HAWTs are associated with higher wildlife mortality from blade collisions, particularly affecting migratory birds species. VAWTs can mitigate this issue through greater visibility and slower rotation speeds, thus reducing wildlife fatalities (Han, 2017).

HAWTs also pose challenges due to their need for generators atop tall towers and gearboxes needed to orient the turbine with the wind, which increase maintenance and operational costs, as well as safety risks (Wind Energy Technologies Office, 2018). In contrast, VAWTs eliminate the need for orientation mechanisms by capturing wind from any direction and housing generators at the base, simplifying maintenance and enhancing safety (Kamran, 2023). Additionally, HAWTs require significant spacing between turbines to avoid aerodynamic interference from wakes, which can diminish efficiency by up to 40% if turbines are placed too close (WPT, 2024). This necessitates extensive land or sea areas for HAWT farms. Conversely, VAWTS can be situated in close proximity without suffering from the detrimental wake effects commonly associated with HAWTs. In fact, research indicates that VAWTs can benefit from their placement near one another, as their wakes can interact in a manner that enhances their overall efficiency and energy production, due to HAWTs being able to harness energy from multiple directions (Hansen, Mahak, Tzanakis, 2021). Furthermore, VAWTs benefit from a compact design allowing for denser installation, which optimises land use and enhances power generation per unit area (Kamran, 2023).

Figure 14 - HAWT's Vs VAWTS (Wind Energy Technologies Office, 2018)



3.2 How to Integrate Vertical Axis Wind Turbines

Ørsted successfully completed the Hornsea 1 and 2 wind farms in 2022, and is currently constructing Hornsea 3 adjacent to these installations. As shown in Figure 16, Hornsea 4 is set to be located approximately 69 kilometres off the Yorkshire coast, with construction due to start after the completion of its predecessors (Ørsted, 2024 -b). To successfully integrate VAWTs at Hornsea 4, Ørsted should initiate a pilot testing phase to optimize VAWT performance and establish partnerships with manufacturers for reliable supply and technical support of VAWTs (Moullin, et.al., 2020). If the pilot phase is successful and reliable partnerships with manufacturers are formed, I propose that Ørsted starts the transition to VAWTs with the new planned Hornsea 4 project. If successful, they can scale up this transition to other projects.

Figure 15- Ørsted’s Hornsea projects (Ørsted, 2024 -b)

3.3 Cost and Revenues of Horizontal Axis Wind Turbines

The Planning Inspectorate (2024) estimates Hornsea 4's costs at £5 billion to £8 billion, covering capital and operational expenditures throughout its whole lifespan. Reflecting on the Hornsea 3 project's escalated costs to £8.5 billion from similar initial estimates (Ørsted, n.d. -d), the upper estimate of £8 billion for Hornsea 4 is likely. The project plans to install 180 HAWTs across 846 km², aiming for a capacity of up to 2.6 GW (Ørsted, 2024; Planning Inspectorate, 2024).

To calculate the predicted annual kWh output for Hornsea 4, the formula used is: Total Annual Energy Output = Capacity × Capacity factor × Annual hours. The capacity factor, which measures actual energy production against potential output, was 46.6% for Hornsea 1 in 2022 according to Energy Numbers UK (Smith, A.Z.P, 2022). Assuming Hornsea 4 has a similar capacity factor, its annual output is estimated at 10,603.896 GWh/year (2600 MW × 0.466 × 8760 hours). Over a typical 25-year lifespan for HAWTs (Ørsted, n.d. -e), the total production would be approximately 265,097.4 GWh, or 265,097,400 MWh for the Hornsea 4 project.

Last year, Ørsted secured a rate of £37.35/MWh for Hornsea 3 from the UK government (Reuters, 2023). Assuming Hornsea 4 secures the same rate, estimated revenue is (£37.35/MWh × 265,097,400 MWh) £9,907,885,390. Therefore, the potential 25-year profits can be estimated to be approximately (£9,907,885,390 - £8,000,000,000) £1,907,885,390.

3.4 Cost savings and Revenues gained from Vertical Axis Wind Turbines

To assess the cost savings and revenue potential of using VAWTs over HAWTs in the Hornsea 4 project, it's vital to compare power density, Levelised Cost of Energy (LCoE), and capacity factors. The LCoE is a crucial metric for assessing the cost-effectiveness of energy generation technologies. The LCoE for Hornsea 4 can be computed using the formula: LCoE = Total Lifetime Costs ÷ Total Lifetime Electricity Production. Substituting in the values, the LCoE for Hornsea 4 wit HAWTs is approximately £30.17/MWh, calculated by dividing the £8 billion projected costs by the predicted total electricity generation of 265,097,400 MWh. Research from Sandia Labs indicates that offshore VAWTs could have a 20% lower LCoE than HAWTs (SeaTwirl AB, n.d.). These findings are further supported by SeaTwirl, a VAWT manufacturer, findings of a 21% LCoE reduction from their VAWT technologies. (SeaTwirl AB, n.d.). This lower LCoE for VAWTs is due to reduced maintenance and production costs, as VAWTs do not need gearboxes and house generators closer to sea level, simplifying maintenance and production. Applying the 20% reduction in LCoE, the adjusted LCoE for Hornsea 4 using VAWTs would be £24.14/MWh (£30.17/MWh × 0.80).

Research by Dr. Ouro for SeaTwirl compared the layouts of 25 HAWTs and 25 VAWTs across different land areas (Ouro, 2023). This study showed that VAWTs achieve a power density of about 19 MW/km², significantly exceeding the 2.65 MW/km² typical for HAWTs (Johansson, 2022), due to reduced wake effects and smaller size. For Hornsea 4, with an area of 846 km² and a capacity of 2600 MW, the current power density is 3.07 MW/km² (2600 MW divided by 846 km²). Switching to VAWTs could potentially increase Hornsea 4’s power density by 519%. Additionally, SeaTwirl’s VAWTs demonstrated a 65% capacity factor in their first three months of operation (Skälegård, 2018), substantially higher than Hornsea 1's 46.6%. This suggests more efficient energy production, enhancing VAWTs' financial viability.

With HAWTs, the Hornsea 4 has a predicted power density of 3.07 MW/km² and total capacity of 2.6 GW. Using VAWTs could increase the power density to approximately 19 MW/km², raising the total capacity to 16.074 GW (846 km² × 19 MW/km²). Assuming a SeaTwirl’s 65% capacity factor for VAWTs, the annual energy output can be predicted to be (16,074 MW × 0.65 × 8760 hours) 91,815 GWh/year.

Over the project's 25-year lifespan, this totals 2,295,375 GWh. The projected lifetime costs with the lower LCoE predicted for using VAWTs would therefore be (£24.14/MWh × 2,295,375,000 MWh) £55,404,635,000. If Hornsea 4 with VAWTs secures the same rate of £37.35/MWh as Hornsea 3, total revenue over 25 years would be (£37.35/MWh × 2,295,375,000 MWh) £85,716,281,250. Thus, the profit from using VAWTs is calculated as (£85,716,281,250 - £55,404,635,000) £30,311,646,250 from the same area of land. Compared to the projected £1,907,885,390 profit using HAWTs, adopting VAWTs could potentially increase profits by approximately £28,403,760,860 over 25 years.

4 - Risk management

4.1 Wind turbine failure

To conduct a risk analysis using the Expected Monetary Value (EMV) method for Ørsted UK requires focusing on Ørsted's most significant operational risk: the risk of turbine failure. This analysis outlines the probability and potential impact of turbine failures and provide strategies for managing this risk.

Turbine failures can be caused by numerous factors including mechanical issues, extreme weather conditions, and maintenance failures. These failures mean require constant repair. On average, Minor repair per turbine is needed 6.81 times a year, major turbine repair is needed 1.17 times a year, and major turbine replacement is needed 0.29 times a year. The repair time in days is on average is 6.67 days for minor repairs, 17.64 days for major repairs, and 116.19 days for major replacements. (Carroll, et.al, 2016.) The repair costs on average is £140 for minor repairs, £1726 for major repairs, and £40,906 for major replacements. (Carroll, et.al, 2016.) The components that experience the highest failure rates include the pitch/hydraulic system and the generator. (Carroll, et.al, 2016.)

4.2 Impact Assessment

The impact of a turbine failure includes repair costs and lost revenue due to downtime.

Repair Costs**:** Generator failure results in considerable repair expenses. The average cost per turbine can be calculated as follows; minor repairs occur 6.81 times a year at £140 each, totalling £953.40; major repairs happen 1.17 times at £1,726 each, totalling £2,019.42; and major replacements occur 0.29 times at £40,906 each, totalling £11,862.74. Adding these together, the total annual failure expenses for one turbine amount to approximately £14,835.56 (Carroll, et.al, 2016.).

Downtime Losses**:** To determine the average annual downtime due to failures and repairs for one wind turbine, we multiply the frequency of each repair type by the time required for each. Calculating this, minor repairs (6.81 times a year at 6.67 days each) result in 45.42 days, major repairs (1.17 times at 17.64 days each) add up to 20.64 days, and major replacements (0.29 times at 116.19 days each) contribute 33.69 days. Summing these, the total downtime per year is approximately 99.75 days

(Carroll, et.al, 2016.). Assuming an average output of 161.397 MWh per turbine per day (worked out from Hornsea 4 HAWT projections made earlier, 10,603,896MWh a year ÷ 365 days ÷ 180 turbines), with an average wholesale electricity price of £37.35/MWh (Hornsea 3) for Ørsted, and a downtime of 99.75 days (Carroll, et.al, 2016.), the lost revenue amounts to approximately £601,303.43 a year (161.397 MWh x £37.35 x 99.75 days) per turbine.

Total Yearly Impact **:** £14,835.56 (repair) + £601,303.43 (lost revenue) = approximately £616,138.99 per turbine per year. This would cost the Hornsea 4 project around £2.8 billion over 25 years with 180 turbines.

4.3 Risk Mitigation Strategies:

- Pre-emptive Repairs:. It is estimated that 8% of direct O&M Repair Costs can be saved through early intervention and more regular pre-emptive repairs, along with an 11% reduction in revenues from not producing during downtime (Turnbull and Carroll, 2021). Given the total annual impact of repair costs is £14,835.56 per turbine, the annual savings from the reduction in repair costs amount to 8% of £14,835.56, which equals £1,186.84. Additionally, the annual savings from the reduction in revenue losses due to decreased downtime are 11% of £601,303.43, totalling £66,143.38. Adding these two figures gives the total annual savings of £67,330.22. Over the expected 25-year lifetime of the turbine, these annual savings accumulate to an EMV benefit of £1,683,255.50 per turbine. The cost of increased pre-emptive repairs would be labour, but this would likely decrease as the measures would likely reduce the frequency of significant turbine failures.

- Condition Monitoring Systems (CMS): Implementing and improving specialised systems designed to continuously monitor the operational conditions of wind turbines can reduce the probability of failure. The cost of implementing new versions of these systems are around £15,000 for one turbine over the course of its lifetime (Morton, 2013). However, by detecting failures in components earlier, CMS can decrease downtime of wind assets by 1% while simultaneously decreasing operating and maintenance expenses by 2% (SKF, no date). With an annual downtime of 99.75 days and lost revenues at £601,303.43 per turbine per year, a 1% reduction in downtime results in approximately 0.9975 fewer days of downtime, equating to a revenue saving of about £1,643.33 annually (considering the lost revenue calculation). A 2% reduction in operating and maintenance expenses amounts to a savings of £296.71 per year. Over 25 years, the savings from reduced downtime would be £1,643.33 x 25 = £41,083.25 and from reduced operating and maintenance expenses would be £296.71 x 25 = £7,417.75, totalling £48,501. After accounting for the £15,000 costs of the CMS, the net EMV benefit over 25 years is £33,501.00 per turbine.

5 - Summary

In summary, Ørsted maintains superior financial health with better operating margins and financial management compared to its competitors, despite challenges like increased expenses and a growing reliance on debt. The company exhibits strong liquidity and outperforms peers in key financial metrics, affirming its competitive stance in the renewable energy sector. Transitioning from HAWTs to VAWTs could enhance efficiency, decrease operational costs, and improve public acceptance of Wind Turbines. By adopting VAWTs, the Hornsea 4 project's profitability could potentially increase by up to £28 billion over 25 years. Turbine failures are a critical vulnerability for Ørsted. There is a need for constant pre-emptive preventive repairs and advanced monitoring technologies to reduce financial losses and improve the reliability of its wind Turbines.

(4395 words)

6 - References

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7 - Appendix

Formulae for Finance analysis section (fame, 2024)

Formula	
Gross Profit/Turnover	Gross profit Margin %
Operating Profit/Turnover	Operating profit Margin %
Profit (Loss) before Tax/Turnover	Net Profit margin %
Profit after tax/Turnover	Profit Margin %
((Non current liabilities + Loans) / Shareholders funds)	Long Term Gearing Ratio
Net liabilities / Net Assets	Debt to equity Ratio
Current Assets (Cash, debtors & stock) / Current Liabilities	Current (Working Capital) Ratio
(Current Assets - Stock) / Current Liabilities	Acid Test (Quick liquididty) Ratio
PBT/capital used	Return on Capital Employed (ROI) %
Return on Shareholders Capital	Return on Shareholders Funds (%)
debtors/sales	Debt Collection Period (days)
creditors/purchases	Credit payment Period (days)
Turnover/fixed assets	Return on Assets (ROA)
PBT/N. of Employees	Profit Per Employee

Ratios for Finance analysis section (fame, 2024; Orbis 2024)

EDF Energy	2022	2021	2020	2019	2018
Gross profit Margin %	21.66	23.11	34.88	32.16	33.72
Operating profit Margin %	8.21	-0.25	8.67	-3.50	-4.15
Net Profit margin %	-0.56	-20.62	-11.52	-4.70	-5.93
Profit Margin %	-1.74	-23.27	-12.52	-2.72	-4.67
Centrica	**2022**	**2021**	**2020**	**2019**	**2018**
Gross profit Margin %	8.61	11.05	25.46	14.14	13.65
Operating profit Margin %	-1.01	6.47	-2.96	-3.74	3.32
Net Profit margin %	-1.61	5.20	-4.71	-4.87	1.94
Profit Margin %	5.10	8.21	0.33	-6.99	-1.65
Ørsted	**2022**	**2021**	**2020**	**2019**	**2018**
Gross profit Margin %	28.23	33.37	50.18	40.65	29.66
Operating profit Margin %	6.57	10.38	15.85	16.18	10.68
Net Profit margin %	13.01	16.66	33.42	14.32	28.48
Profit Margin %	11.08	13.66	30.02	10.02	23.80

Long Term Gearing Ratio	2022	2021	2020	2019	2018
Ørsted	2.20	2.02	0.88	0.95	0.83
EDF Energy	0.70	0.66	0.60	0.65	0.59
Centrica	5.51	2.75	6.41	4.60	2.13

Liquidity Ratios Ratio	2022	2021	2020	2019	2018
Ørsted Current Ratio	1.51	1.00	1.83	2.00	1.90
Ørsted Quick Ratio	1.32	0.81	1.40	1.53	1.51
EDF Energy Current Ratio	0.82	1.19	1.68	1.68	1.57
EDF Energy Quick Ratio	0.68	0.90	1.12	1.00	0.91
Centrica Current Ratio	0.95	1.11	1.36	0.93	1.03
Centrica Quick Ratio	0.89	1.07	1.32	0.89	0.98

All Ratios (fame, 2024; Orbis 2024)

Ørsted	2022	2021	2020	2019	2018
Gross profit Margin %	28.23	33.37	50.18	40.65	29.66
Operating profit Margin %	6.57	10.38	15.85	16.18	10.68
Net Profit margin %	13.01	16.66	33.42	14.32	28.48
Profit Margin %	11.08	13.66	30.02	10.02	23.80
Long Term Gearing Ratio	2.20	2.02	0.88	0.95	0.83
Debt to equity Ratio	3.15	3.03	1.34	1.15	1.05
Current (Working Capital) Ratio	1.51	1.00	1.83	2.00	1.90
Acid Test (Quick liquididty) Ratio	1.32	0.81	1.40	1.53	1.51
Return on Capital Employed (ROI) %	7.36	7.24	10.68	6.34	15.66
Return on Shareholders Funds (%)	23.25	19.77	20.57	11.54	25.69
Debt Collection Period (days)	55	91	68	54	61
Credit payment Period (days)	62.01	44.23	51.16	71.44	57.02
Return on Assets (ROA)	0.67	0.43	0.39	0.54	0.71
Profit Per Employee	261,000	220,000	344,000	181,000	435,000

EDF Energy	2022	2021	2020	2019	2018
Gross profit Margin %	21.66	23.11	34.88	32.16	33.72
Operating profit Margin %	8.21	-0.25	8.67	-3.50	-4.15
Net Profit margin %	-0.56	-20.62	-11.52	-4.70	-5.93
Profit Margin %	-1.74	-23.27	-12.52	-2.72	-4.67
Long Term Gearing Ratio	0.70	0.66	0.60	0.65	0.59
Debt to equity Ratio	0.97	0.85	0.76	0.80	0.75
Current (Working Capital) Rati	0.82	1.19	1.68	1.68	1.57
Acid Test (Quick) Ratio	0.68	0.90	1.12	1.00	0.91
Return on Capital Employed (R	-0.18	-4.01	-2.20	-1.00	-1.41
Return on Shareholders Funds	-0.27	-6.39	-3.51	-1.64	-2.22
Debt Collection Period (days)	53.12	58.89	53.93	96.97	44.72
Credit payment Period (days)	105.08	N/A	74.41	68.07	67.65
Return on Assets (ROA)	0.3	0.2	0.21	0.23	0.25
Profit Per Employee	-7058	-156,131	-79,075	-31,865	-36,571

Centrica	2022	2021	2020	2019	2018
Gross profit Margin %	8.61	11.05	25.46	14.14	13.65
Operating profit Margin %	-1.01	6.47	-2.96	-3.74	3.32
Net Profit margin %	-1.61	5.20	-4.71	-4.87	1.94
Profit Margin %	5.10	8.21	0.33	-6.99	-1.65
Long Term Gearing Ratio	5.51	2.75	6.41	4.60	2.13
Debt to equity Ratio	21.69	8.85	11.39	9.11	4.21
Current (Working Capital) Rati	0.95	1.11	1.36	0.93	1.03
Acid Test (Quick) Ratio	0.89	1.07	1.32	0.89	0.98
Return on Capital Employed (R	-5.23	8.42	-6.10	-11.91	4.72
Return on Shareholders Funds	-29.92	27.89	-41.75	-61.50	14.56
Debt Collection Period (days)	33.93	38.27	41.09	24.94	25.53
Credit payment Period (days)	8.62	13.42	13.11	9.19	7.11
Return on Assets (ROA)	2.84	2.05	1.83	2.3	2.5
Profit Per Employee	-19,194	-22,405	-22,405	-37,877	18,093

Figures in £1000s for Finance analysis section (fame, 2024; Orbis 2024)

Ørsted	2022	2021	2020	2019	2018
Turnover	16,089,519	9,043,471	6,366,350	8,239,817	9,278,093
Operating Profit	1,056,447	938,814	1,009,311	1,333,595	991,216
Gross Profit	4,541,809	3,018,045	3,194,615	3,349,741	2,751,579
Profit (Loss) before Tax	2,092,809	1,506,300	2,127,734	1,179,710	2,642,236
Retained Profit(Loss) (after tax and div	1,782,257	1,235,150	1,911,234	825,934	2,208,126
Current Assets	13,397,593	9,850,907	7,815,306	6,843,663	8,038,710
Stock & W.I.P.	1,676,125	1,815,002	1,813,070	1,601,752	1,684,608
Current Liabilities	8,897,976	9,866,677	4,278,595	3,417,893	4,221,006
Shareholders Funds (Net Assets)	9,001,493	7,618,629	10,344,919	10,224,227	10,283,687
Total Assets	37,335,415	30,675,668	24,198,749	22,016,529	21,092,342
Total Assets minus Current Liabilities	28,437,439	20,808,991	19,920,154	18,598,636	16,871,336
Long Term Liabilities	19,435,946	13,190,361	9,575,235	8,374,409	6,587,649
Total liabilities	28,333,922	23,057,038	13,853,830	11,792,302	10,808,655

EDF Energy	2022	2021	2020	2019	2018
Turnover	13,700,000	8,720,000	8,074,000	8,172,000	7,737,000
Operating Profit	1,125,000	-22,000	700,000	-286,000	-321,000
Gross Profit	2,967,000	2,015,000	2,816,000	2,628,000	2,609,000
Profit (Loss) before Tax	-77,000	-1,798,000	-930,000	-384,000	-459,000
Retained Profit(Loss) (after tax and div	-238,000	-2,029,000	-1,011,000	-222,000	-361,000
Current Assets	9,992,000	8,683,000	7,280,000	5,947,000	5,704,000
Stock & W.I.P.	1,689,000	2,094,000	2,411,000	2,396,000	2,392,000
Current Liabilities	12,237,000	7,283,000	4,345,000	3,545,000	3,631,000
Shareholders Funds (Net Assets)	28,262,000	28,127,000	26,495,000	23,393,000	20,666,000
Total Assets	55,560,000	52,143,000	46,556,000	42,061,000	36,123,000
Total Assets minus Current Liabilities	43,323,000	44,860,000	42,211,000	38,516,000	32,492,000
Long Term Liabilities	15,061,000	16,733,000	15,716,000	15,123,000	11,826,000
Total liabilities	27,298,000	24,016,000	20,061,000	18,668,000	15,457,000

Centrica	2022	2021	2020	2019	2018
Turnover	23,741,000	14,744,000	12,249,000	22,674,000	29,686,000
Operating Profit	-240,000	954,000	-362,000	-849,000	987,000
Gross Profit	2,045,000	1,629,000	3,119,000	3,206,000	4,053,000
Profit (Loss) before Tax	-383,000	767,000	-577,000	-1,104,000	575,000
Retained Profit(Loss) (after ta	1,210,000	1,210,000	41,000	-1,584,000	-490,000
Current Assets	20,688,000	19,885,000	10,412,000	8,295,000	8,666,000
Stock & W.I.P.	1,269,000	644,000	324,000	431,000	459,000
Current Liabilities	**21,711,000**	17,976,000	7,665,000	8,885,000	8,382,000
Shareholders Funds (Net Asset	1,280,000	2,750,000	1,382,000	1,795,000	3,948,000
Total Assets	29,038,000	27,086,000	17,119,000	18,154,000	20,557,000
Total Assets minus Current Lial	7,327,000	9,110,000	9,454,000	9,269,000	12,175,000
Long Term Liabilities	6,047,000	6,360,000	8,072,000	7,474,000	8,227,000
Total liabilities	27,758,000	24,336,000	15,737,000	16,359,000	16,609,000